***Claims***

That which is claimed is:

1. A method of imaging the semiconductor sites in an integrated circuit (IC) comprising the steps of setting-up a device that simultaneously produces two separate images of the IC sample from one light source, and refining the images to generate an exclusive high-contrast image of the semiconductor sites.

2. The method of claim 1, wherein said method generates an exclusive high-contrast image of the metallic sites in an IC sample.

3. The method of claim 1, wherein said device is comprised of an optical microscope set-up; a light source that excites the IC sample; a beam-scanning and sample-scanning mechanism to control the focused excitation beam and transverse and axial scanning of the sample; a driving and control software to scan the focused excitation beam from one pixel location of the sample to another; a personal computer (PC) to implement the control of the instrument, the data acquisition system and the post-detection processing, a data acquisition system consisting of two analog-to-digital converters to digitize the photodetector signal and the 1P-OBIC signal and store it in the PC; a data control software which allows the PC to control the scanning of the focused beam on the sample and to acquire the resulting confocal reflectance and 1P-OBIC signals that are generated from the sample; and a photodetector to convert the confocal reflectance signal from the sample into an equivalent electrical signal which is sampled by the analog-to-digital converters to the PC.

4. The method of claim 3, wherein said microscope is a beam-scanning confocal reflectance microscope that simultaneously generates both one-

photon optical beam-induced current (1P-OBIC) image and confocal reflectance image of the IC sample.

5. The method of claim 3, wherein said light source is laser.

6. The method of claim 3, wherein said light source is a spectrally filtered light source with a broadband spectrum.

7. The method of claims 5 and 6, wherein via a beam splitter, the output beam of the light source is directed to a scanning mirror system composed of two galvanometer mirrors for $x$ and $y$ scanning, and two lenses that constitute a 4f transfer lens.

8. The method of claim 7, wherein another pair of lenses expands and collimates the scanned beam and inputs it to an optical microscope assembly.

9. The method of claim 8, wherein an infinity-corrected objective lens focuses the beam into the exposed top surface of the integrated circuit.

10. The method of claim 9, wherein a precise two-dimensional scan control of the focused beam is achieved via a pair of digital-to-analog converters.

11. The method of claim 10, wherein the reflected light is collected back by the infinity-corrected objective lens and focused by lens towards a pinhole that is placed in front of photodector.

12. The method of claim 11, wherein the 1P-OBIC is measured by inputting the output of the pin that is nearest to the probe surface area to a current-to-voltage converter composed of an operational amplifier and a feedback resistor.

13. The method of claim 12, wherein the other converter input is the common reference for the electronic circuits including the integrated circuit sample.

14. The method of claim 1, wherein the exclusive high-contrast image of the semiconductor site is derived from the pixel to pixel product of the 1P-OBIC image and the confocal reflectance image using the equation $s(x, y, z) = i_r(x, y, z)i_s(x, y)$ where $s(x, y, z) \geq 0$.

15. The method of claim 2, wherein an exclusive high-contrast image of the metallic sites is obtained from the product of the complementary OBIC image and the confocal image using the equation: $m(x, y, z) = i_r(x, y, z)i_m(x, y)$ where $i_m(x, y) = \kappa - i_s(x, y)$ and $\kappa$ is a constant that represents the highest $s(x, y, z)$ value that is possible for a given optical set-up.